UPPER TRISHULI-1 HEP (216MW)			
Client	Doosan Heavy Industries & Construction		
DHI's Subcontractor	Power Construction Corporation of China		
REPLY COMMENT			
Subcontractor	Power Construction Corporation of China		
Incoming Document			
Title of the Document	**Hydraulic Calculation of Diversion Tunnel**		
Document/Drawing No.	UT1-C-010-CVL-DC-42001	Revision	0C
Review Document No.	**UT1-HEP-DHI-PC-D-0001**	Reviewed Note No.	**RN-0058**
Received Date	**22.2.2022**	Review status	**AN**
Outgoing Document			
Previous Reply No.	RC-0014	Previous Reply Date.	**17.01.2022**
Reply No.	RC-0030	Reply date	**06.04.2022**

General Comments

The hydraulic calculation of diversion tunnel doc.ref.:UT1-C-010-CVL-DC-42001 Rev.0C has been submitted including the reply document RC-0014.However the reply document RC-0014 includes also reply comments to OE's RN-0025 on Design Optimization Proposal for River Diversion Scheme including the cofferdams.

This review note RN-0058 only comments the document UT1-C-010-CVL-DC-42001_0C in technical aspects.

1 Analysis purpose

a) It is understood that the expression "at this stage" means detail design of the project. However, with this expression it is still not clear if the 20-year dry season flood standard will be assumed for further calculations as well in future or it will be still changed.

Reply: The 20-year dry season flood standard is the design standard of the diversion tunnel, the corresponding discharge is 208 m^3/s. The design standard (20-year dry season flood, discharge 208 m^3/s) will not change.
In the dry season, the cofferdam retains the water and the water flows through the diversion tunnel. With the dry season diversion concept, the principle is that the dam construction will be carried out in the dry season and suspended in the flood season.in order to gain the more construction time, duration of the dry-season river diversion scheme is extended to November, in which the monthly river flow is relatively not large.

b) In RC-0014 reference is made to "chapter 3.2 of design optimization proposal-

diversion works". As there are already existing many DOP documents regarding diversion works the corresponding document has to be specified in detail (codification, revision, date).
Reply: Accept.

c) If reference has to be made to another document, it has to be mentioned accordingly with complete document codification and title. The reference document has to be mentioned as well in chapter "2 Reference Documents".
Reply: Accept.

2 Reference Documents

a) All reference documents including drawings (layout, cross/-longitudinal sections) have to be mentioned.
Reply: Accept.

3 Design Criteria

a) The hydrological analysis should be performed for only one period. Separating the months of November to April from May to October period should be avoided.

Reply: Accept.

b) The plotting of the 44 years period shows an extreme outlier for the highest flood. This flood value needs to be questioned and either be discarded or justified because it messes the entire analysis up.
Reply: In the DOP of diversion works, the choosing and of application flood value have been fully demonstrated. In this calculation report we just quote the flood value.

c) The correct design dimensions of each relevant structure have to be shown, e.g. crest elevations of cofferdams, cross- and longitudinal sections, including reference documents.
Reply: Accepted.

Chapters 4 to 6 Hydraulic formulas, discharge and characteristic water levels

a) The flow equation: The flow equation that is used represents equation for the overflow. The equation that should be used for the free flow condition in the tunnel is the energy equation. With this equation the water level in the whole tunnel can be defined. Energy of the water at the outlet should be compared with the energy of water in the riverbed, for checking if the hydraulic jump will occur inside the tunnel or if there is hydraulic jump at all
Reply: Accepted and the calculation of hydraulic jump has been added in the calculation report.

b) Pressure flow equation: according to the references stated in the report, used equation is defined for "Discharge rating curves for a valve discharging freely into air or into an enlarged, well-vented conduit can be developed from the equation". This is the quote from the reference. In the document there is an example for the calculation of the tunnel.

Reply: Accepted.

c) For the calculation of the tunnel, pressurized or free flow, there should be a table where all relevant data (invert elevation, outlet elevation, upstream and downstream

water levels, losses, etc.). should be presented for easier follow up and checking from the reviewer. The graphical presentation should be present as well.
Reply: Accepted.